

ASTRONOMY 490 - SENIOR SEMINAR - CRITICAL THINKING

Fall. 3 credits.

Prerequisite: Admission by consent of instructor only.

Hours: Tu, Wed, 4:30-6:00 PM, C. Sagan, Room 415, Space Sciences

Critical thinking in scientific and nonscientific contexts with examples from the study of Astronomy and other fields. Topics will include elements of classical logic and rhetoric, including standards of evidence. Case studies will include examples of competing hypotheses in the history of science, as well as examples from borderline science and medicine, religion and politics. Stress will be laid on creative generation of alternative hypotheses and their winnowing by critical scrutiny. Discussion will be both qualitative and quantitative.

Students from a wide diversity of fields will be admitted, but must be well-qualified. They will be expected to assimilate an extensive reading list; the seminar itself will be devoted to the implications of the readings and the interaction of the participants.

Final Written Examination

Astronomy 490

Critical Thinking

(Due 12:00 noon, May 20, 1988 in
304 Space Sciences Building)

"Anyone who in discussion relies upon authority uses, not his understanding, but rather his memory. . ."

-- Leonardo da Vinci, The Literary Works of Leonardo da Vinci, edited by J. P. & I. A. Richter, Oxford University Press, 1939, Vol. 2, p. 85.

"It is a quality of faith that it rings the neck of reason . . . But how? It holds to God's Word: Let it be right and true, no matter how foolish and impossible it sounds. So did Abraham take his reason captive and slay it, inasmuch as he believed God's Word, wherein was promised him that from his unfruitful and as it were dead wife, Sarah, God would give him seed. . . There is no doubt faith and reason mightily fell out in Abraham's heart about this matter, yet at last did faith get the better, and overcame and strangled reason, that all-cruellest and most fatal enemy of God. So, too, do all other faithful men who enter with Abraham the gloom and hidden darkness of faith: they strangle reason . . . and thereby offer to God the all-acceptable last sacrifice and service that can ever be brought to Him."

-- Martin Luther, quoted in C. Beard, The Reformation of the 16th Century, Williams and Norgate, London, 1903 p. 163

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Read Festinger et al.'s When Prophecy Fails. Now imagine that you were a member of the University of Minnesota's research team and the events described went somewhat differently:

- (1) a charismatic leader -- sincere or unscrupulous (your choice) -- arises in the circle around Marian Keech; and

(2) by chance there are serious floods on December 21 and/or UFO's are widely reported on Christmas Eve.

- Describe your best estimate of what might have happened as a result of these altered events over the next few years, informed by our readings and class discussions, including the Milgram experiments.
- Compose a dialogue, taking place 34 years later (i.e., now) between a believer in Clarionite intervention and a skeptic, making the best case possible for both points of view.
- What lessons, if any, can we draw?

As usual, there is no single "right" answer. What I'm looking for is coherency and cogency of argument. I hope you enjoy the assignment.

Carl Sagan
May 6, 1988

8/28/86

BOOKS ORDERED SO FAR FOR ASTRONOMY 490

REQUIRED

1. On Liberty, John Stuart Mill (Norton Edition)
2. ~~Science and Unreason, Radner & Radner (Pbk-Wadsworth)~~
3. Extraordinary Popular Delusions and the Madness of Crowds, Mackay (Noonday Press)
[The bookstore ordered this for us but has now told us that they cannot obtain it - out of print] remove it out of print
4. Attacking Faulty Reasoning, T. Edward Damer (Wadsworth, 1980)
5. ~~Flim-Flam, James Randi (Prometheus Books, 1982)~~
5. The Evolution of Cooperation, Robert Axelrod (Basic, 1984). [paper]

RECOMMENDED

1. Introduction to Logic, Wayne Davis (Prentice Hall, 1986)
2. On Liberty: Man Vs. State, Milton Mayer (Center for the Study of Democratic Institutions, Santa Barbara, 1969)
BOOK IS OUT OF PRINT
3. Science and the Paranormal, Abell & Singer, eds. (Scribner, 1981)

Summary, remaining class sessions

March 9	Beesley/Stern	Palestinian State	
March 11			
March 16	Bernstein/Freedman	Is religion pernicious?	Mill
March 18	No Class		
March 30	Halverson/Engst Pelton/Camhi	World hunger Scientific responsibility for global problems	
April 1	Mill; Milgram		
April 6	Jim Maas		
April 8	Korologos/Strange Rossi/Kim	SDI Affirmative action	
April 13	No Class		
April 15	No Class		
April 20	Goebel/Foster Hare/Wang	Prayer in public schools Voluntary eugenics	
April 22	Gross/Wilson Ires/Chung	U.S. education a failure? Death penalty	
April 27	TBA		
April 29	Goldman/Longfellow Laitamaki/Schrager	Legalize heroin? Life after death	
May 4	TBA		
May 6	Exam handed out		